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Robotic Skies

Intelligence, Surveillance, Reconnaissance and the Strategic Defense of Japan

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Cover Image

The United States Navy's new Broad Area Maritime Surveillance unmanned aerial vehicle provides broad, non-stop coverage of some 2,000 nautical miles of sea and terrain. It is not armed and instead serves strictly as a platform for persistent surveillance using multi-function active sensors.

(Photo courtesy of Northrop Grumman)

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Executive Summary

As Japan's emerging security environment grows increasingly dangerous and less certain, Japan should modernize and integrate its intelligence, surveillance and reconnaissance (ISR) capability. Doing so would serve five principal purposes. First, enhancing Japan's ISR abilities would dramatically extend Japan's ISR "horizon" by using very high-altitude unmanned aerial vehicles (UAVs) coupled with ground-based tools to analyze and utilize intelligence. The ability to see and hear farther would enhance Japan's defense and provide earlier warning of regional security developments. Second, unmanned technology would complement Japan's manned forces operations. Third, the adoption of a "layered" ISR approach would fill informational and operational gaps in Japan's current ISR system, providing vital resilience to the nation's defenses. Fourth, an ISR capability based on a "system of systems" approach centered on commercial computing and communications technologies would allow Japan to process and share intelligence more rapidly. Finally, enhanced ISR capabilities would expand Japan's strategic relevance and ability to cooperate with the United States and other potential partners in monitoring daily operations in the region. By developing robust ISR capabilities during peacetime, Japan would be better able to avoid and, if necessary, manage regional security in crises.

Japan needs a better picture of its regional neighborhood to confront its two principal regional security challenges: an unpredictable North Korea and a reemerging China. North Korea's ballistic missile and nuclear weapons programs pose a direct threat to Japan. Additionally, a rising China – with its rapid and extensive military build-up over the last thirty years, lack of transparency and increasingly aggressive rhetoric – is making Japan's security environment less predictable and more risky. Exacerbating these threats are gaps in Japan's very high-altitude and wide-area ISR capabilities and limited capacity for exploiting such intelligence. Specific recent events in northeast Asia demonstrate Japan's vulnerability. For instance, in April 2010, two Japan Self-Defense Force destroyers were surprised to come across a Chinese People's Liberation Army Navy flotilla comprising eight naval ships and two submarines as it transited the Miyako Strait, southwest of Okinawa. The incident exposed a gaping hole in Japan's capacity to provide adequate surveillance of the crucial straits within its Ryukyu island chain. Given the trend of increasing Chinese naval and air operations in the South and East China Sea, as well as the unpredictability of a well-armed North Korean regime in political transition, the time is ripe for Japan to redress this vulnerability before it grows.

This paper argues that ISR is important for Japan's strategic defense in particular and for regional security in general. The introduction examines the role of ISR capabilities. The second section analyzes Japan's shifting strategic environment and growing need for improved ISR capabilities and integration, including ground-based analysis and use of the information that is retrieved. The third section examines the evolution of ISR technologies, with a focus on recent advances in UAVs. Finally, the paper assesses how Japan might utilize enhanced ISR through its alliance with the United States, by bolstering its national capacity, and by cooperating with other key countries in the wider Asia-Pacific region.

Introduction

Intelligence, surveillance and reconnaissance capabilities, which are strategically important in peacetime, are a vital national asset in crises when time is a critical factor in decision-making and demands for information escalate drastically. This is why estimates of what a country will need in a crisis drive ISR force planning, which include such factors as ISR platform design; operating parameters; sensor coverage and redundancy; and the collection, analysis and dissemination of information to political decision makers and military commanders.

To see is to understand, and to understand is make timely and prudent decisions.

In recent years, Japan's security environment has grown increasingly less secure, making the collection and dissemination of intelligence, surveillance and reconnaissance information more important than ever to Japan's defense. To see is to understand, and to understand is to make timely and prudent decisions. In Japan's increasingly uncertain security environment, a robust, carefully developed and effectively integrated ISR capability is essential. Japan's national ISR capabilities can be envisioned in the context of a number of operational scenarios that define Japan's international security environment: the Sea of Japan, the East China Sea, the South China Sea, the Ryukyu Islands and the Horn of Africa. Through broader information sharing arrangements, Japan can rely on the United States, and perhaps other allies and regional actors, for some of this capability. Still, Japan should also take steps to enhance its own capabilities.

There are five components of a modern, integrated ISR capability that could greatly improve Japan's defense capabilities. To start, very high-altitude unmanned aircraft are available to Japan for the first time thanks to technological breakthroughs, providing a host of new opportunities and choices for ISR capabilities. With these aircraft, Japan could extend its ISR "horizon" dramatically.[1] The ability to see and hear much farther and earlier would substantially enhance Japan's defense and provide earlier warning of regional security developments. Second, effective ISR is operationally demanding and can be especially taxing on pilots who fly reconnaissance missions. New unmanned systems, therefore, allow significant economies of force for crewed Self-Defense Force operations. Third, enhanced Japanese ISR would fill existing national informational and operational gaps. Fourth, a national "system of systems" approach would increase the effectiveness of Japan's ISR mission. ISR command and control and analysis are key system functions across Japan's Self-Defense Forces and throughout its national self-defense infrastructure. Fifth, Japan should consider connecting strategically relevant ISR capabilities with those of its principal ally, the United States, and other international partners. A Japanese national ISR planning dialogue that parallels alliance planning discussions would be part of a larger aerospace capabilities planning process.

Japan's Strategic Environment and Self-Defense Rationale for ISR

Regional security factors highlight the value to Japan of enhanced intelligence, surveillance and reconnaissance, and suggest the need for a serious reconsideration of Japan's ISR posture. President Eisenhower, for example, understood that in order to be able to assess the Soviet Union's intentions, the United States had to be able to "see" Soviet military deployments and operations. Similarly, robust ISR can provide essential self-defense information to Japanese political leaders and military commanders. Enhancing ISR can provide vital information regarding military and related activities in the maritime and air commons surrounding Japan, which are the strategic approaches to the Japanese homeland.

Security relations in northeast Asia are increasingly uneasy and heightened uncertainty is likely to drive regional powers to compete militarily in the sea, air, outer space and cyberspace commons. Among the factors challenging the region's peace and security have been incidents at sea, increased military deployments, covert action, disputes over resource exploitation, smuggling, piracy and terrorist activity. The region's maritime commons, in particular, have become increasingly contested with disputes over the South China Sea involving six claimant states, the row between China and Japan over the Senkakus, and the sinking of the South Korean corvette *Cheonan* on March 26, 2010. Given this situation, an ISR capability that can track security developments and allow Japan's civilian and military leaders greater warning time to make informed decisions is a high priority.

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Since the demise of the Soviet Union, Japan, and the region more generally, have faced serious challenges from North Korea and China. The threat posed by North Korea has endured since the end of the Korean War. The virtually unanimous international condemnation of the Kim regime in Pyongyang has allowed analysts, planners and political leaders to deal with the North Korean threat relatively directly. Until recently, the impact of the threat posed to Japan by North Korea was limited to planning for the indirect ramifications of a war on the Korean peninsula including coordinating the evacuation of Japanese citizens from the peninsula; providing rear-area support to U.S. forces engaged in combat operations on the peninsula; operating in support of those operations from Japan or passing through Japan en route to the peninsula; and coping with potentially massive refugee flows across the Sea of Japan from the peninsula.

But North Korea's ballistic missile and nuclear weapons programs threaten Japan much more directly today than, say, a decade ago. While the Kim regime has become arguably less stable since the 2008 stroke of Kim Jong-il, North Korea's military arsenal has become more lethal. The challenge posed by North Korea means that Japan no longer has a wide margin of safety. Uncertainties surrounding North Korea's leadership succession have seized the headlines since the Workers' Party conference in September 2010 elevated Kim's third son to the rank of general and the unofficial heir apparent. Equally serious, Pyongyang's record of weapons proliferation and transfers is particularly unsettling, given that both missiles and nuclear weapons components and technology are involved.[2]

Additionally, China's meteoric emergence over the last three decades presents Japan with a huge strategic challenge. The military dimensions of China's rise, in particular, have become increasingly worrisome. China has repeatedly expanded its defense budget, enlarging its inventory of new ships, aircraft, missiles and other weapons. In addition, China's rhetoric has become more bellicose and its military deployments more confrontational. Examples include China's lack of transparency on security issues; the self-professed aim of denying the U.S. military access to the Western Pacific; an increasingly aggressive assertion of unilateral claims to contested maritime territory and strategic resources in the East China Sea and South China Sea; and equally aggressive Chinese naval patrols and expanding jurisdictional claims.

The People's Liberation Army is developing both anti-access missiles and blue-water naval capabilities that would allow it to dominate the Western Pacific. The development of these capabilities reflects much more than China's effort to end the still-unresolved civil war between the mainland and the Republic of China on Taiwan. In fact, it signals a strategic warning of China's intention to eventually deny U.S. military access to the Asia-Pacific as exemplified by its claims to disputed maritime territory and referrals to the South China Sea as a "core interest." China's legal and economic strategies are profoundly at odds with those of Japan and many states in Southeast Asia. In effect, China is mounting a challenge to freedom of the global commons. As CNAS Fellow Abraham Denmark writes:

> Asia's rise and America's geopolitical preeminence have been dependent on the physical openness of the global commons – the seas, air, space, and cyberspace – which has been sustained by U.S. military dominance since the end of World War II.
>
> Yet the emergence of new Asian military powers is creating states with a significant degree of influence over the security of the commons. The emergence of these pivotal states is driving both cooperation and competition throughout the Asia-Pacific region. Shared interest in the openness and stability of the global commons will compel like-minded states to cooperate in security operations and diplomatic initiatives. Uncertainty about China's rise, combined with distrust over the region's many simmering territorial disputes, will also drive the region's new powers to compete militarily with one another.[3]

To deal with both the North Korean and Chinese threats, Japan requires greater strategic warning capabilities along the East Asian littoral from Singapore to Sakhalin. Knowing where to look will decide what capabilities Japan will need for effective strategic reconnaissance.

Although they are only one element of ISR, UAVs provide a perfect illustration of how Japan can improve its security situation. Higher-altitude, longer-endurance UAVs with advanced sensors are transforming strategic reconnaissance. UAVs now have the ability to relay critical information instantly to the U.S. Armed Forces and America's allies, as a result of numerous improvements over the last several years. The United States has employed UAVs extensively in conflict zones such as Afghanistan and Iraq, where they improve situational awareness and ensure a rapid response to hostile forces. The widespread recognition of the benefits of UAVs – including better performance at a fraction of the cost of manned aircraft – is bringing the next generation of these aerial systems into sharp focus. Providing these systems with the ability to cooperate across vast distances and with respect to different parts of the electromagnetic spectrum will be a high priority.[4]

Japan has already made significant progress in establishing a modern ISR capability. It has placed four Information Gathering Satellites on orbit,[5] and maintains a fleet of Air Self-Defense Force and Maritime Self-Defense Force (JMSDF) reconnaissance aircraft, complemented by JMSDF ships. This regional ISR capability forms the potential basis for a more comprehensive Japanese ISR capability.

The Past, Present and Future of ISR

Intelligence, surveillance and reconnaissance are critical to a nation's strategic defense. Many nations are actively employing ISR throughout the global commons of sea, air, space and cyberspace in order to collect, process and disseminate data in support of current and future national security needs. Some ISR activities are related to a specific domain or military service. Naval platforms, for instance, focus on naval and maritime activity. Other ISR operations occur at higher organizational levels, such as the National Reconnaissance Office in the United States. Some intelligence operations, often at the

national level, get direct support from ISR efforts, providing them with early warning and tactical military information.[6] ISR can enhance the capabilities of self-defense systems both individually and collectively. Both militaries and civilian governmental entities conduct national ISR operations.[7]

THE PURPOSE OF ISR

Intelligence, surveillance and reconnaissance comprise a crosscutting national security function. Military forces are often responsible for collecting information concerning another state's military plans, force structure and levels, force disposition and current operations. ISR also makes a vital contribution to strategic and operational early warning.

ISR involves remote information gathering that depends on either visual observation or enhanced visual observation via electro-optical means (imagery intelligence) or enhanced listening via specialized receivers (signals intelligence). ISR sensors can "see" and "hear" across the frequency spectrum. Individual sensors are designed to exploit specific frequency bands that humans associate with their own senses. While some platforms and even some sensors are multifaceted, platform missions and technical and operational disciplines have formed around these frequency bands.

ISR can be viewed as a "system of systems" – an explicitly designed, operated and maintained combination of individual reconnaissance systems – that collect information across the electromagnetic spectrum. As such, ISR is foremost a family of collection capabilities that, taken together, can provide a more complete picture of another nation's military operations. This means that some ISR platforms may have more than one sensor and that other ISR technologies are designed to collect information unavailable by other means. Satellites are representative of this latter ISR capability.

ISR sensors are becoming increasingly complex, providing greater resolution than ever before, and in smaller and lighter packages that require less power to operate. This means that airborne and orbiting technology with mounted ISR sensors can provide better performance at lower cost, thereby putting these tools within the reach of nations with even modest defense budgets.

Modern ISR technologies are also becoming increasingly powerful. Both purpose-built UAVs with ISR capabilities and militarized modern commercial aircraft continue to increase in range, airspeed, altitude and endurance. An example of this trend is the P-8 Poseidon, a military aircraft Boeing is currently developing for the United States Navy. The P-8, a variant of Boeing's commercial 737 airplane, will eventually replace the U.S. Navy's capable but aged P-3 Orion (itself a militarized version of the Lockheed Electra commercial aircraft).

Advances in remote operation technologies, along with enhanced sensors, have revolutionized the use of UAVs. These intelligence, surveillance and reconnaissance UAVs range from very small, hand-launched versions to much larger, transcontinental-range versions such as RQ-4 Global Hawk – an unmanned, high-altitude, long-endurance aircraft – which far exceeds the performance of the U-2 Dragon Lady in terms of mission duration for lower cost – a manned, high-altitude surveillance aircraft used by the United States Air Force.

TRADITIONAL AEROSPACE ISR APPROACHES

National leaders and military planners are competing against their counterparts in other countries to collect strategic, operational and tactical national security information. Given that ISR is a tremendous national security enabler, the country with the best collection capability has a significant advantage. (Denial and deception capabilities are also an important part of the ISR competition.)

Conversely, nations without effective ISR are at a serious national security disadvantage.

Traditional approaches to aerospace ISR have taken a layered approach. In layered ISR operations, commanders use multiple assets in combination to obtain sensor coverage over a larger area and during a longer period than any one asset can achieve. To achieve the intended goal, the commander must develop the optimal mix and positioning of strategic-level assets, such as satellites or high-altitude UAVs, and tactical level assets. Technologies and assets that have longer endurance and wide-area sensors that can perform the initial search and detection capability of an area are generally the best candidates for layered ISR operations. This allows more tactical platforms with lesser endurance to fully share information with wide-area search technologies.

Aircraft and satellites have provided intelligence, surveillance and reconnaissance of potential adversarial forces for decades, from their early Cold War origins in which bombers and fighter aircraft were modified for reconnaissance up to the conceptual, doctrinal and technological breakthrough of the U-2 Dragon Lady. These have included low-altitude and medium-altitude tactical reconnaissance aircraft, reconnaissance satellites and high-altitude strategic reconnaissance aircraft.

Historically many nations have fielded tactical reconnaissance aircraft. A partial inventory of U.S. Cold War-era tactical reconnaissance aircraft includes the RF-86F Sabre, the RF-4 Phantom and the photo pod-equipped F-15 Eagle (examples of fighter aircraft fitted for photo reconnaissance missions) and the P-2 Neptune and the P-3 Orion (a versatile maritime patrol aircraft with an ISR mission, and with specialized ISR variants such as the EP-3E ARIES). Japan's Self-Defense Forces have operated these P-2 and P-3 aircraft and their specialized ISR versions.[8]

The U-2 "Dragon Lady," provides high-altitude, all-weather surveillance and reconnaissance, day or night, in direct support of U.S. and allied forces.

(U.S. Air Force)

Like tactical reconnaissance aircraft, specialized ISR aircraft operating in the mid-altitude strata have proliferated widely. American ISR aircraft have included the RB-47 Stratojet (eventually phased out and replaced by the much more capable U-2 and the SR-71); the diverse USAF family of EC/RC-135 aircraft (typical of larger "big wing" aircraft optimized for ISR missions); and the now-retired EC-121 Warning Star, the E-3A Sentry Airborne Warning and Control System (AWACS) and the E-2C and E-2D Hawkeye (Air Force and Navy early warning and control aircraft). Japan's Air Self-Defense Force operates a 767-based version of the E-3A and the Northrop Grumman E-2C.

There are only a few examples of manned high-altitude strategic reconnaissance aircraft, including the U-2 Dragon Lady and the SR-71 Blackbird. These specialized aircraft are typically built for a specific purpose; operate at high levels of performance; and require specialized engineering, support and operations. They are essentially equivalent in performance to orbiting satellites, although with a different flight profile. They are national strategic assets and extraordinarily expensive. Until now, their highly sophisticated aeronautical and sensor technologies have kept them beyond the reach of most nations. As a result, few countries have been able to afford to design, build, or operate this class of aircraft.[9]

Orbiting reconnaissance satellites cannot replicate every capability of the low- through high-altitude manned ISR platforms, but they conduct some missions well. With the advent of extraordinarily sensitive reconnaissance cameras, other radar imaging and electronic sensors and tacit international agreement not to interfere with satellite reconnaissance, orbiting ISR satellites can survey vast swathes of territory in periodic sweeps. Geostationary satellites can "stare" at a particular region with a variety of sensors for specialized missions.

Significantly, in addition to national reconnaissance satellite programs, there are now numerous international and commercial reconnaissance satellites that carry a variety of electro-optical and synthetic aperture radar sensors. This emerging market reflects not only the advances in launch technology and satellite operations, but also the development and proliferation of sophisticated sensor technologies and packages.

THE ISR SPECTRUM

ISR has multiple functions, including information gathering based on imaging (imagery intelligence) or signals collection (signals intelligence). The information provided by ISR is valuable to decision makers only after it has been converted into a useable form in a timely manner. The rapid sharing of information among military leaders and civilian government officials is key to maintaining situational awareness and establishing a common operational picture. Combined and collated ISR information is far more valuable than its individual components. In other words, the whole is greater than the sum of its parts.

Layered ISR can include the use of satellites, high-altitude UAVs and lower-altitude or tactical assets. Aircrafts and other assets with longer endurance and wide-area sensors are most useful in providing the initial search and detection capability of an area. This enhanced capability allows wide-area search technologies to cue or send signals instantly to more tactical platforms with lesser endurance.

ISR has experienced six main trends in recent years. First, more space-based ISR information has become available to civil, military, commercial and private consumers. Second, low- through high-altitude ISR platforms remain necessary because reconnaissance satellites cannot replicate every ISR capability. Third, developments in sensor technology are making ISR cheaper, smaller and lighter. Fourth, digitization of imagery is reducing the weight and expense of technology for various platforms and giving decision makers more options. Fifth, the growing development and fielding of multiple types of UAVs is creating a greater distribution of tactical ISR capabilities. Sixth, despite a variety of technical advancements in ISR, high-altitude systems remain unique, because they offer penetrating coverage at a standoff range from a neighboring country that no other system can provide. Very high-altitude, long-endurance (HALE) ISR-equipped UAVs can now provide around-the-clock information.

AN EFFECTIVE ISR CAPABILITY: BALANCED AND INTEGRATED

In summary, a balanced intelligence, surveillance and reconnaissance capability gives national decision makers greater opportunities in detecting activity in the global commons from farther away and more flexibility when making timely national security decisions. A balanced ISR force also provides additional layers of capability. From a decision maker's perspective, the overlap and redundancy provided by a capable ISR force are especially important factors in being able to take confident action. A balanced ISR force also provides operating economies, substituting where appropriate unmanned platforms that reduce the burden on crewed platforms.

Well-integrated ISR assets and capabilities are also important to national leaders. Not every sensor or platform can detect all activity in its field of view,

and of course no sensor can see everywhere. These limitations put a special value on the system of systems design and command and control of ISR capabilities, and on the integration of information developed by the ISR force. The implication is that, while ISR platforms and sensors must be connected in a network, the ISR system of systems extends well beyond the platforms, sensors and crews conducting these missions. Command and control, analysis and distribution functions and organizations are additional essential mission elements that make up a modern ISR capability.

NEW DEVELOPMENTS IN ISR

The United States is the only country that operates intelligence, surveillance and reconnaissance forces at every altitude. Still, the ISR club of nations is becoming larger and increasingly competitive. Countries that were once holding their own in the ISR competition must work harder to keep up, while countries that are lagging are at risk of falling further behind.

Several developments are driving the expansion of ISR capabilities and the intensity of ISR competition. First, space is no longer is an exclusive enclave. Eleven nations are now orbiting ISR satellites, and that number is expected to increase to 12 in 2012. The international availability of commercial reconnaissance satellites means that both state and non-state actors can benefit from space-based ISR without the expense of national space programs. This commercial benefit is, of course, offset by the insecurity of commercial sources in times of crisis. Second, new sensor developments are making modern ISR cheaper, smaller and lighter. This affects the ISR chain at every level: Very sophisticated ISR payloads have become much easier to fly. Third, digitization of photography reduces problems of weight and expense. Despite their intense development in the mid-1950s, early U-2 camera magazines still contained two miles of very wide format film. Cumbersome in-flight aircraft recovery systems were designed to snatch film canisters ejected from early photo reconnaissance satellites. However in modern ISR, digitization of all-spectrum collection – not just imagery – drastically reduces the need for these recovery systems and avoids weight penalties. Fourth, the globalization of aircraft manufacturing has led to the modification of more airframes of various sizes to carry ISR sensor packages. These airframes are affordable for many more users; the commercial price is a steep discount from having to maintain a costly national aircraft manufacturing capability as a national security priority. Fifth, the explosive development and fielding of UAVs have prompted a broad distribution of tactical ISR capabilities. Just as with manned aircraft, sensor packages can be mounted on these vehicles and the absence of life-support systems makes additional room for sensors. However, the higher echelons of ISR have experienced a less dramatic impact, as has the globalization of aircraft manufacturing more generally. High-altitude systems remain a unique commodity. They are rare on orbit and even rarer in the upper reaches of the atmosphere.[10] But new HALE UAV aircraft, such as the RQ-4 Global Hawk, are the bellwether of change.

The RQ-4 Global Hawk is a high-altitude, long-endurance UAV with an integrated sensor suite that provides intelligence, surveillance and reconnaissance, or ISR, capability worldwide.

(Photo courtesy of Northrop Grumman)

These developments have implications for current and future members of the ISR club. Strategically

relevant ISR capabilities at every altitude are now within reach of most of the Group of 20 industrial and emerging-market nations. Layered ISR – in most if not all of its dimensions – will soon be available to nations that can afford it. The imminent availability of higher ISR operating altitudes means that penetrating reconnaissance without atmospheric overflight will be increasingly common. HALE UAV ISR platforms operating on 24-hour flight schedules will be able to provide around-the-clock information.

The Future of Japanese ISR

Twenty-first century security requirements are elevating the importance of prevention and early action, which in turn underscore the need for a clear understanding of rapidly developing events. The fusion of intelligence, surveillance and reconnaissance points to the complexity of bringing together all-source information. The strategic and operational challenges of providing surveillance of the great expanse of East Asia are too large for any one government to bear. Hence, in addition to bolstering its national capabilities, Japan must enhance its cooperation with allies and other partners.

Japan should consider a three-pronged strategy to enhance its national ISR capabilities. First, it should collaborate with the United States in planning for alliance-based ISR initiatives. All evidence points to Washington being receptive to suggestions for such collaboration, and there are numerous precedents for having done so in the past. Second, Japan should expand its independent ISR capabilities. Third, it should build new ISR partnerships with regional friends and allies that have overlapping security concerns and ISR requirements in the region. Australia, India, and South Korea are obvious candidates.

EXPANDING ISR WITHIN THE CONTEXT OF THE JAPAN-U.S. ALLIANCE

It is good news for Japan that the United States has been the global leader in ISR since the beginning of the Cold War. The 1960 Mutual Security Treaty between the United States and Japan has as its first mission the defense of Japan. As treaty partners committed to the defense of Japan and peace and stability in the Asia-Pacific, the United States and Japan should continue their collaboration on improving national and bilateral ISR capabilities to fill gaps in the maritime, air, space and cyberspace coverage of Japan. Furthermore, America's extensive experience with ISR is a useful, if not exclusive, guide for Japanese ISR planning.

The latest Quadrennial Defense Review (QDR) was published in February 2010[11] during what *Aviation Week and Space Technology* refers to as an "airpower revolution in autonomous systems." According to that publication "Automated, adaptive systems for processing, exploiting and disseminating intelligence, surveillance and reconnaissance data are a 'real near-term need' ... because of the increasing use of wide-area airborne surveillance systems downlinking multiple video feeds."[12]

The QDR, which prescribes a robust ISR force, carries Secretary of Defense Robert Gates' imprimatur on current and future U.S. defense planning. Truly a wartime report and a key planning milestone, the QDR appeared after Secretary Gates' stern insistence that the Department of Defense follow through on fielding sufficient unmanned aerial vehicles to the battlefields in Iraq and Afghanistan. Secretary Gates felt strongly enough about continuing resistance to his explicit direction to the Air Force regarding UAVs that the failure of the Air Force secretary and chief of staff to follow his guidance in this regard was partly responsible for their abrupt dismissal. The QDR takes a highly deliberate approach to ISR – both platforms and capabilities: Field more and better manned and unmanned ISR assets, and get them to Iraq and

Afghanistan where they will do the most good on the battlefield. The QDR's emphasis on current battlefield (Iraq and Afghanistan) as well as a future battlefield (air-sea battle) underscores the importance of ISR in today's Pentagon.

ISR is an important aspect of regional readiness, deterrence and response. In the Asia-Pacific, China's development of its anti-access and area-denial rhetoric, strategic doctrine, and military capabilities poses considerable challenges to Japanese and American planners. With its emphasis on regional stability and allied collaboration, the QDR should reassure Japanese decision makers. More specifically, the QDR chartered the development of a joint air-sea battle concept, which has been a joint focus of the U.S. Air Force and U.S. Navy. The concept will address how air and naval forces will integrate capabilities across all operational domains to counter growing challenges to U.S. freedom of action. As it matures, the concept will also help guide the development of capabilities needed for effective power projection operations. Although the QDR does not dictate the specific shape of air-sea battle concepts being considered jointly by the U.S. Air Force and Navy (in Asia as in other regions), it is apparent that allies, alliances and ISR will play a significant role.[13] On the need to deter and defeat aggression in anti-access environments, the QDR states:

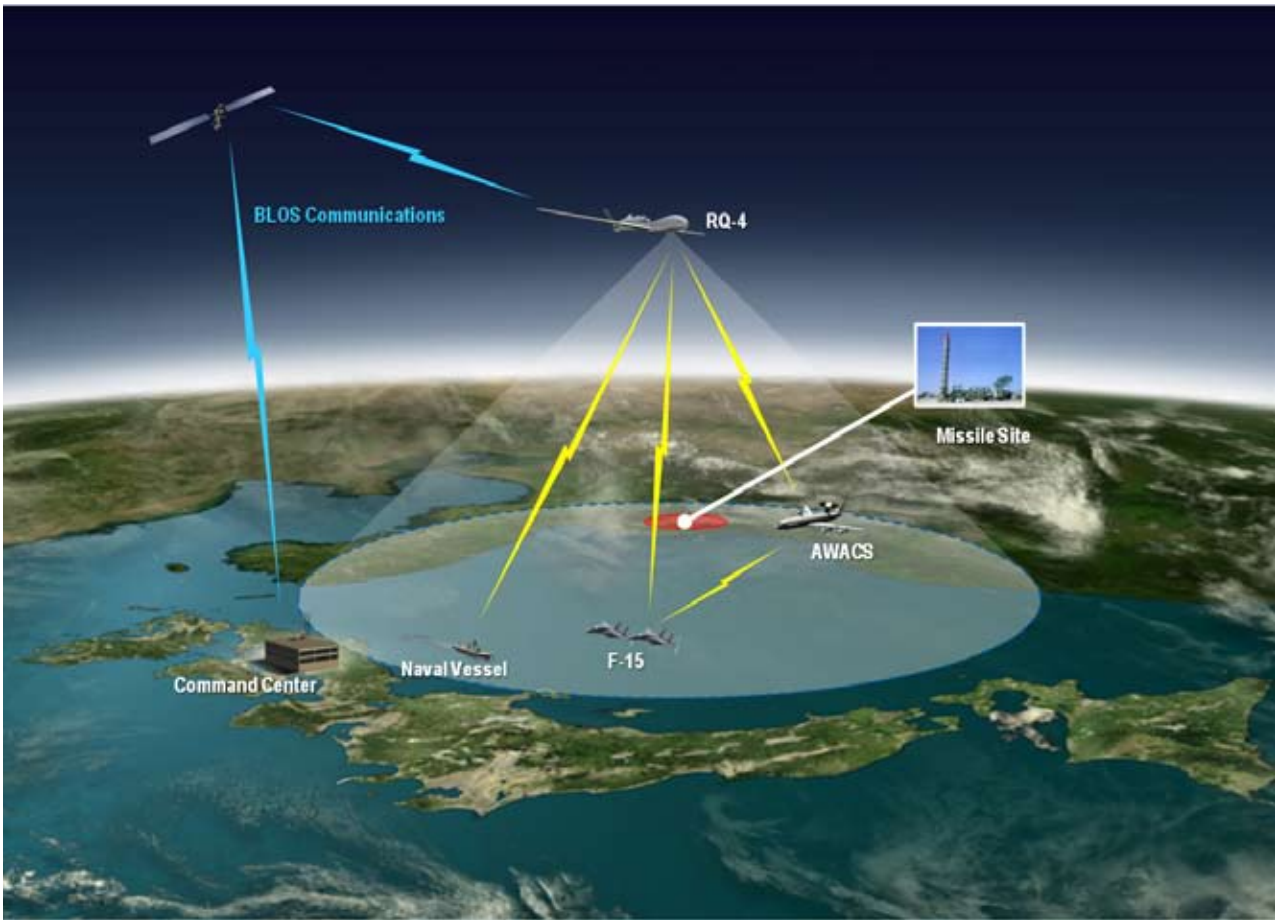
> Chinese military modernization is a general concern in the Asia-Pacific region. As part of its long-term, comprehensive military modernization, China is developing and fielding large numbers of advanced medium-range ballistic and cruise missiles, new attack submarines equipped with advanced weapons, increasingly capable long-range air defense systems, electronic warfare and computer network attack capabilities, advanced fighter aircraft, and counter-space systems. China has shared only limited information about the pace, scope, and ultimate aims of its military modernization programs, raising a number of legitimate questions regarding its long-term intentions ... Accordingly, the Department of Defense is taking steps to ensure that future U.S. forces remain capable of protecting the nation and its allies in the face of this dynamic threat environment. In addition to ongoing modernization efforts, this QDR has directed a range of enhancements to U.S. forces and capabilities.[14]

Japan's uncertain security situation makes an aerospace dialogue that defines future needs more important than ever. This dialogue begins with the United States and should include discussion of current and future bilateral ISR capabilities. The dialogue would fit within the U.S.-Japan Capabilities Assessment dialogue, which is conducted at the military-to-military level, with diplomatic and policy involvement in the familiar four-party "2+2" arrangement. As a point of reference, the issue of missile defense provides a useful example of how the United States and Japan have been able to make good progress in a complex alliance planning dialogue.

EXPANDING JAPAN'S ISR CAPABILITIES

While Japan reviews how much cooperation can be provided through closer collaboration with the United States, it should also consider expansion of its own national ISR capabilities. The two processes need to be coordinated within the context of the alliance. Indeed, a Japanese national ISR planning dialogue that parallels alliance planning discussions could be part of a larger aerospace capabilities planning process.

Japan's national ISR capabilities can be envisioned in the context of a number of preliminary but realistic operational scenarios that define Japan's international security environment: the Sea of Japan, the East China Sea, the South China Sea, the Ryukyu Islands and the Horn of Africa. It is in these areas where Japanese interests intersect with North Korean and Chinese operations, and where enhanced Japanese airborne ISR capabilities would pay great dividends, forming the basis for considering how to develop ISR acquisition and operational programs. A convenient



A concept of a layered approach to ISR in the East China Sea region.

(Photo courtesy of Northrop Grumman)

way to visualize this requirement is to consider Japan's Air Defense Identification Zone, notionally illustrated below.

ISR command and control and analysis are crucial for Japan's overall security infrastructure. It is not simply the military that is integral to the system. Civilian organizations, akin to the U.S. National Reconnaissance Office, for instance, must control ISR operations and provide the critical analysis that turns real-time information into strategic, operational, and tactical decisions.

Japan's initial ISR requirement is to integrate (or at least coordinate) its patrol and reconnaissance forces. Visualizing how an effective layered Japanese national ISR capability might look is the first step in this process.

As the following illustration shows, Japan does not possess high-altitude reconnaissance aircraft that could fill this and other gaps and enhance the operations of other platforms. HALE UAV platforms could fill this gap in Japan's high-altitude ISR capabilities.

EXPANDING REGIONAL PARTNERSHIPS

Finally, Japan should consider expanding partnerships with countries beyond the United States. Ready-made international "east to west" ISR

architecture is in place and waiting for countries to connect the pieces. Australia, India, South Korea and the United States have common ISR objectives, motivations and interests with Japan and often operate common equipment. These overlapping capabilities and national interests could furnish the basis for future collaboration that could have great strategic significance.

Conclusion

Continuing uncertainty over Japan's security environment and the availability and capacity of unmanned aerial vehicles suggest that senior officials in Japan and elsewhere will look increasingly to robotic skies for protection. New capabilities are available to Japan and other nations, including new HALE UAV platforms with greatly enhanced performance and capability. Adopting these enhanced ISR capabilities will help decision makers provide for the strategic defense of Japan and East Asia now and for years to come.

Japan can increase its security using a three-pronged strategy, requiring it to (1) improve ISR cooperation with the United States; (2) enhance Japan's national ISR capabilities within its legal airspace of its exclusive economic zone; and (3) cooperate with other key nations in the region on ISR, given that regional security concerns and ISR needs will increasingly overlap in the future. Potential ISR collaborators include Australia, India and South Korea.

The need for timely and accurate intelligence, surveillance and reconnaissance does not stop at the water's edge or at territorial limits or at the edge of Japan's Air Defense Identification Zone or exclusive economic zone. Rather, the ISR requirements confronting Japan and its international allies, partners and friends span Indo-Asia and the Asia-Pacific. This review highlights the opportunity for connecting strategically relevant Japanese ISR capabilities, not only with those of its ally the United States, but also with those of emerging international partners.

ENDNOTES

1. ISR horizons can be expanded literally and figuratively. The radar horizon of an aircraft flying at 60,000 feet is 400 miles.

2. Sheena Chestnut, "Illicit Activity and Proliferation: North Korean Smuggling Networks." *International Security* 32, no. 1 (Summer 2007): 80-111. http://belfercenter.ksg.harvard.edu/publication/872/illicit_activity_and_proliferation.html. "Since public disclosure by the Democratic People's Republic of Korea (DPRK) of its uranium enrichment program in 2002 and the subsequent restarting of its plutonium reactor, policymakers and academics have expressed concern that the DPRK will one day export nuclear material or components. An examination of North Korea's involvement in nonnuclear criminal activities shows that the DPRK has established sophisticated transnational smuggling networks, some of which involve terrorist groups and others that have been able to distribute counterfeit currency and goods on U.S. territory. These networks provide North Korea with a significant amount of much-needed hard currency, but the DPRK regime's control over them has decreased over time. These developments suggest that North Korea has both the means and motivation for exporting nuclear material, and that concerns over nuclear export from the DPRK, authorized or not, are well founded. When placed in the context of the global nuclear black market, the North Korea case suggests that criminal networks are likely to play an increased role in future proliferation. In addition, it raises the concern that proliferation conducted through illicit networks will not always be well controlled by the supplier state. It is therefore imperative to track and curtail illicit networks not only because of the costs they impose, but also because of the deterrent value of counter-smuggling efforts. New strategies that integrate law enforcement, counter-proliferation, and nonproliferation tools are likely to have the greatest success in addressing the risks posed by illicit proliferation networks."

3. Abraham Denmark, "Asia's Security and the Contested Global Commons" in *Asia's Rising Power and America's Continued Purpose*, Ashley J. Tellis, Andrew Marble, and Travis Tanner, editors, National Bureau of Asian Research (Seattle: September 2010).

4. Steve Gardner, "Trends in Communication Systems for ISR UAVs," *MilSat Magazine* (Jan/Feb 2009). http://www.milsatmagazine.com/cgi-bin/display_article.cgi?number=893938022

5. Failures have reduced the number of operating satellites to three; a subsequent set of four more IGS satellites is planned.

6. Some definitions of ISR (Intelligence, Surveillance, and Reconnaissance) include the "Targeting" function as well (Intelligence, Surveillance, *Target Acquisition*, and Reconnaissance or ISTAR).

7. For instance, the Central Intelligence Agency has a long history of conceiving, designing, building and operating ISR systems since the Eisenhower administration.

8. "Defense Ministry halts project to convert F-15s into reconnaissance planes," *Yomiuri Shimbun* (2 October 2010). "The Defense Ministry announced on Oct. 1 that it would halt a project to convert Air Self-Defense Force F-15 fighters into reconnaissance planes, saying that the reconnaissance cameras and other equipment to be delivered by Toshiba Corp. did not meet the ministry's performance requirements. The project to upgrade the F-15s into reconnaissance planes started in fiscal 2006. The ministry was considering converting one by fiscal 2011 as a prototype, and mass-producing about 10 thereafter."

9. An historically interesting exception is that the Republic of China Air Force operated the U-2 for many years, in close collaboration with the CIA and the U.S. Air Force.

10. High altitude systems can be duplicated, however. Because form follows function, it is no surprise that the Global Hawk high-altitude, long-endurance (HALE) UAV is remarkably similar in appearance to the U-2.

11. *Quadrennial Defense Review Report* (U.S. Department of Defense, February 2010).

12. Graham Warwick, "Air Power Without Manpower: Autonomous systems could help the U.S. Air Force cut costs and meet future threats," *Aviation Week & Space Technology* (13 September 2010): 48-50.

13. *Quadrennial Defense Review Report* (U.S. Department of Defense, February 2010): 32.

14. Ibid., 30-31.

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